

beginning at an outward boundary of the intermediate region and
extending to a tip end of the blade, the inner region being swept
forward and the intermediate region being swept rearward at a
sweep angle that does not decrease; and
the tip region is translated forward relative to a leading
edge with the same sweep angle as the outward boundary of the
intermediate region, to provide a sweep angle that causes the
blade to intercept the shock.

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89. The turbomachinery blade of any one of claims 4 to 7,
wherein the inner region extends between a root end of the blade
and the inward boundary of the intermediate region, and the
entire inner region is swept forward.

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10. A blade for a gas turbine engine fan comprising a
plurality of blades mounted for rotation within a case
circumscribing the blades and forming an outer boundary for a
working medium gas flowing through passages formed by neighboring
blades, wherein:

the blade has a configuration enabling the fan to rotate at
speeds providing supersonic flow velocities over the blade in at
least a portion of each passage;

the blade has a leading edge with an inner region ending at
an inward boundary of an intermediate region and a tip region

beginning at an outward boundary of the intermediate region and
extending to a tip end of the blade, the inner region being swept
forward and the intermediate region being swept rearward at a
sweep angle that does not decrease from the inward boundary of
the intermediate region to the outward boundary of the
intermediate region; and

throughout the tip region the sweep angle is less than the
sweep angle at the outward boundary of the intermediate region.

10 11. The blade of claim 10, wherein the tip region is
translated forward relative to a leading edge with the same sweep
angle as the outward boundary of the intermediate region.

11 12. The blade of claim 11, wherein the inner region extends
between a root end of the blade and the inward boundary of the
intermediate region, and the entire inner region is swept
forward.

15 13. The blade of claim 10, wherein the tip region maintains
a rearward sweep throughout the tip region.

16 14. A gas turbine engine fan, comprising a plurality of
blades mounted for rotation within a case circumscribing the

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blades and forming an outer boundary for a working medium gas
flowing through passages formed by neighboring blades, wherein:
each blade has a configuration enabling the fan to rotate at
speeds providing supersonic working medium gas velocities over
the blade at least in the vicinity of the passages proximate to
the case;
each blade has a leading edge with an inner region ending at
an inward boundary of a swept intermediate region and a swept tip
region beginning at an outward boundary of the intermediate
region and extending to a tip end of the blade, the inner region
of each blade being swept forward and the intermediate region of
each blade being swept rearward at a sweep angle that does not
decrease from the inward boundary of the intermediate region to
the outward boundary of the intermediate region; and
throughout the tip region the sweep angle of each blade is
less than the sweep angle at the outward boundary of the
intermediate region.

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21. The gas turbine engine fan of claim 20, wherein the tip
region is translated forward relative to a leading edge with the
same sweep angle as the outward boundary of the intermediate
region.

18 22. The gas turbine engine fan of claim 21, wherein:

the intermediate region sweep angle of each blade increases
throughout the intermediate region; and
the tip region sweep angle of each blade decreases
throughout the tip region.

19 23. The gas turbine engine fan of claim 22, wherein the

inner region of the leading edge of each blade begins at a root
end of the blade and extends to the inward boundary of the
intermediate region, and the entire inner region of each blade is
swept forward.

20 27. A gas turbine engine fan comprising a plurality of

identical blades, each blade being mounted for rotation within a
case circumscribing the blades and having an inner wall forming
an outer boundary for a working medium gas flowing through
passages formed by neighboring blades, wherein:

each blade has a configuration enabling the fan to rotate at
speeds providing supersonic working medium gas velocities over
the blade in the vicinity of the passages proximate to the case;

each blade has a leading edge with an inner region, an
intermediate region and a tip region, the inner region extending
to an inward boundary of the intermediate region, and the tip

region extending from an outward boundary of the intermediate
region to a tip end of the blade; and

the inner region is swept forward, the intermediate region
is swept rearward at a sweep angle that does not decrease, and
the tip region is translated forward relative to a leading edge
with the same sweep angle as the outward boundary of the
intermediate region.

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42. The gas turbine engine fan of claim 27, wherein the
inner wall of the case is perpendicular to pressure waves that
extend spanwise of the blades as they rotate, the waves being
incident to the case wall in a region of the blades.

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43. The gas turbine engine fan of claim 27, wherein a
projection of the tip end of each blade onto a radial plane is
parallel to the inner wall of the casing in longitudinal cross-
section.

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30. A blade for a gas turbine engine rotatable within a
case at speeds providing supersonic flow over at least a portion
of the blade, wherein the blade has a leading edge with a forward
swept inner region, the inner region ending at a rearward swept
middle region having a sweep angle that does not decrease